

**Domain****ELECTRONICS****Title:****Apply knowledge of high frequency  
circuits****Level: 2****Credits: 10****Purpose**

This unit standard specifies the competencies required to apply knowledge of high frequency circuits. It includes the demonstrating knowledge of high frequency circuits, simulating high frequency circuits, analysing High Frequency circuits. This unit standard is intended for those who work in electronics industry.

**Special Notes**

## 1. Entry information

Pre-requisites

- *Unit E01 - Apply health and safety rules and regulations in electronics workplace*
- *Unit E02 - Plan and organise work in electronic work environment*

2. Assessment evidence may be collected from a real or a simulated workplace in which electronics operations are carried out.

3. To demonstrate competence, minimum evidence of knowledge of high frequency circuits, knowledge and application of different transmission techniques, analysis of high Frequency circuits, simulation of high frequency circuits (at least 50 percent of all areas in the element) is required

4. Glossary of terms:

- IEC 60617- International Electro-technical Commission IE AM – Amplitude Modulation, FM – Frequency Modulation, PM – Phase Modulation, FSK – Frequency Shift Keying, PSK – Phase Shift Keying, ASK – Amplitude Shift Keying. EE- Institute of Electrical and Electronics Engineers.

5. Performance of all elements in this unit standard must comply with industry standards.

6. Regulations and legislation relevant to this unit standard include the following:

- Labour Act, No. 11, 2007.
- IEC 60617 standards, standard for electrical components symbols.
- Occupational Health and Safety Regulations No. 18, 1997 and all subsequent amendments.

7. Performance of all elements in this unit standard must comply with industry standards.

### **Quality Assurance Requirements**

This unit standard and others within this subfield may be awarded by institutions which meet the accreditation requirements set by the Namibia Qualifications Authority and the Namibia Training Authority and which comply with the national assessment and moderation requirements. Details of specific accreditation requirements and the national assessment arrangements are available from the Namibia Qualifications Authority and the Namibia Training Authority on [www.nta.com.na](http://www.nta.com.na).

## **Elements and Performance Criteria**

### **Element 1: Demonstrate knowledge of high frequency circuits**

#### **Range**

High Frequency components include antennas, RF cables, connectors, splitter or combiners, attenuators and amplifiers, dummy loads etc.

#### **Performance Criteria**

- 1.1 High frequency components and their symbols are identified from manufacturer`s manual and in accordance with IEC/IEEE standards.
- 1.2 Components terminals/ports are identified from data sheet.
- 1.3 Uses of High frequency components are explained and their applications described.

### **Element 2: Demonstrate different transmission techniques**

#### **Range**

Transmission techniques include Analogue to digital conversion, line coding, channel coding, multiplexing, transmission modes and modulation.

Line coding methods include, bi-polar, return to zero, non-return to zero, Manchester coding.

Channel coding methods include parity check, hamming check, cyclic redundancy check (CRC).

Transmission modes include simplex, half duplex and full duplex.

Modulation techniques include AM, FM, PM, ASK, FSK, PSK, PAM, PCM.

Multiplexing techniques include TDM, FDM, CDM, WDM, and SDM.

#### **Performance Criteria**

- 2.1 Analogue signals are converted to digital signals, and digital signals are converted to analogue signals.
- 2.2 Different types and sources of noise are identified and categorised.
- 2.3 Different line coding methods are applied in signals transmission to minimise the effect of noise.
- 2.4 Different transmission modes are employed to transmit information.

- 2.5 Different channel coding methods are employed for error detection and correction.
- 2.6 Multiplexing techniques are employed for transmission of information.
- 2.7 Different modulation techniques are employed to transmit information.
- 2.8 Wave function  $F(t) = A \sin(2\pi ft + \phi)$  is employed in the analyses of analogue and digital modulation techniques.

### **Element 3: Analyse High Frequency circuits**

#### **Range**

High frequency circuits to be analyzed include but not limited to, Modulators (AM, FM, PM, FSK, PSK, ASK), demodulators, filters, attenuators, amplifiers and oscillators.

Parameters to be measured include frequency, power, wavelength, signal strength, Voltage Standing Wave Ratio (VSWR), gain, current, voltage etc. High frequency circuits to be measured include high frequency amplifiers, high frequency generators, attenuators, antennae, splitters, combiners, dummy loads

#### **Performance Criteria**

- 3.1 High frequency band is identified from the electromagnetic spectrum.
- 3.2 Different functional blocks from a physical system are identified.
- 3.3 Applications of different high frequency circuits are identified based on their advantages and disadvantages.
- 3.4 High frequency circuits are constructed.
- 3.5 Measurements and/or calculations are performed to determine the functionality of high frequency circuits using appropriate instruments.
- 3.6 Measured and/or calculated results are recorded and interpreted.

### **Element 4: Simulate high frequency circuits**

#### **Range**

High frequency circuits to be simulated include high frequency amplifiers, high frequency generators, attenuators, antennae, splitters, combiners, dummy loads  
Parameters to be measured include frequency, power, wavelength, signal strength, Voltage Standing Wave Ratio (VSWR), gain, current and voltage.

#### **Performance Criteria**

- 4.1 High frequency circuits are captured in simulation software.
- 4.2 Appropriate virtual instruments are used to measure parameters.
- 4.3 Simulation results are recorded with appropriate SI units.
- 4.4 Further calculations are performed based on the recorded results.

### **Registration Data**

<b>Subfield:</b>	Electrical Engineering
<b>Date first registered:</b>	
<b>Date this version registered:</b>	
<b>Anticipated review:</b>	
<b>Body responsible for review:</b>	Namibia Training Authority

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